

# COASTAL PLANNING AND THE EVALUATION OF COASTAL STRUCTURES IN TERMS OF SUSTAINABILITY

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Coasts are cross-sections of the water and land environments, for thousands of years they formed under the factors of climate, geological, geomorphological, topographic and hydraulic and it has reached a natural balance. But increasingly this natural balance is disrupted due to human impact. Coasts, with their strategic position, are a wealth of resources for people with endless possibilities and mild climate. Therefore, coasts continuously have remained under great pressure just because of residential, transportation, energy, economy and tourism. These pressures can be minimized by applying the principles of science and engineering with a rational urban planning. It will be held after an urban planning at the macro level, as a part of that plan, it should be considered in the design of optimal engineering structures. Therefore, the structure of the planning and design engineering for optimal site selection should be done and compatible structures integrated with topography and bathymetry such as coastal hydrodynamics should be designed. In this paper, after briefly the occurrence and type of coasts, the strategic importance of coastal will be highlighted and coastal planning and engineering structures in Turkey will be examined in terms of sustainability by demonstrating some examples and solutions will be proposed for encountered problems.

*Keywords:* Urban planning, Natural balance, Shoreline protection, Land use, Zoning.

## 1 INTRODUCTION

Mankind has been interested in coastal areas since historical times. This is due to coastal zones not only provided many possibilities such as fishing, navigation, transport, trade for coastal zones but also have been source of wealth for beyond the coastal areas. That is why many civilizations were born in coastal areas. Presently, humans are also taking a strong interest in these areas. Therefore, the integrated planning approach is too serious issue about coasts. In fact by Integrated Coastal Zone Planning it is provided to preserve the ecological, natural characteristics of coastal areas, as it is also provided to prevent possible harms to that delicate balance which is formed of the interaction of water, land and air.

The rapid population increase in urban areas started where the economic values of this land increased and speculations were observed in those days. A number of buyers or capitalists have conflict each other in order to possess land from these regions. Hence the unplanned changes in urban areas and coast line got started in this way. As a result

of these adverse effects the over loading at the eco-systems and environments such as the excess use of natural sources, the damage coastal areas and pollution of soil. Water and air were observed. Istanbul is typical clear example for these unpleasant changes in Turkey.

In this paper, considering the characteristics and formation of the coastal geomorphology at the specified location, which is Istanbul, the impact of human to the physical environment and the need of integrated planning at especially cities having shores as well as the impact of these adverse changes will be discussed. Therefore, it was thought that Istanbul would be a clear example. For this reason, some observations in the field were made and, related reports, projects, articles were considered.

## **2 BASIC TERMS AND DEFINITIONS**

### **2.1 Sustainability**

Sustainability concept was first mentioned by Brundtland Report which could be defined as meeting the needs of the present without compromising the ability of the future generations to meet their own needs.

### **2.2 Coastal Planning**

The coastal planning is regulating the shore use within the scope of scientific methods and public demands. Coastal cities have been susceptible to any changes.

### **2.3 Shoreline**

Shoreline can be defined as the line where water surface and land meet. Naturally, water level is variable containing maximum and minimum values, therefore, shoreline is also changeable.

## **3 ENTEGRATED PLANNING**

Unplanned and uncontrolled accumulation of overpopulation, which took place in the coastal city, results in much more catastrophic consequences. Deteriorated structures are not only ecological, but also the social and economic structure. This situation has inevitably made the adoption of sustainable management methods necessary by using of coastal areas within taking a sustainable approach to planning in a integrated approach. For example, the principles which are prepared by DAMPO (Research Planning Architecture Consultancy Company) for the Ministry of Public Works and Settlement Republic of Turkey, determined for Iskenderun Gulf Coastal Zone Integrated Planning and Management Project is provided in Table 1.

## **4 ENGINEERING PLANNING**

Planning may be defined as organizing the intending future works in a sensible way and sorted by priority of each work. The coastal planning is regulating the shore use within the scope of scientific methods and public demands. The basic parameters that will be considered in terms of coastal engineering can be expressed as coastal climate,

morphology, wave and sediment movements (Figure 1). Coastal engineering generally carries on a work in the following fields (Kabdasli 2015).

- **Protection of Shoreline:** Coastal structures, coastal revetments, seawalls, groins and strakes are considered.
- **Protection of the area behind the shore:** The structures listed above may be designed under this topic too.
- **Harbor Construction:** A suitable design of seawall has great importance.
- **Protection of embouchure:** The structures listed above may be designed under this topic too. Besides, bottom scanning may be performed.
- **Special marine structures:** Headworks, discharges, oil rigs, open sea wave energy power plants, submarine pipelines can be considered.

In terms of coastal engineering, sustainable planning and design of the structures mentioned above contribute to sustainable shore use. For design of the structures, the following data are analyzed.

- **Climate Data:** Wind, precipitation and fog are prominent data.
- **Wave Analysis:** Frequency, period, maximum and minimum wave height and possibility are needed
- **Flow and vortex analysis:** Due to differences density of sea water, or some other factors flow or vortex may occur in the area.
- **Morphological Data:** Geological and geophysical analysis of the plant area and determine of bathymetry.
- **Environment impact Assessment:** Analyzing the plant's adverse impacts to the environment in construction and run phases.
- **Economic Analysis (Feasibility):** Plant must be feasible in technical and economic ways.

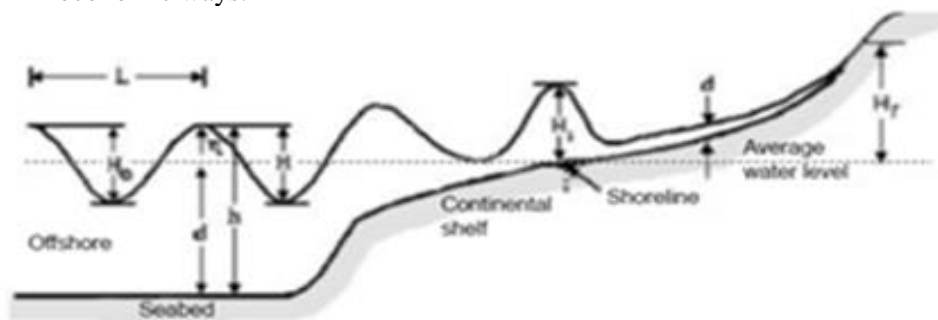


Figure 1. A profile of coastline of sea (Kabdasli 2015).

However, harbors may be divided into different types based on functions. Here, the general criteria for the determination of harbor site location will be given as follows (Yuksel 2000).

- Geographical location should be well chosen.
- Port inlet must be determined in accordance with waves, currents and sand movements.
- Allocating sufficient space to ships to berthing easily to the dock should be considered.
- Convenient locations for the installations should be determined.
- At least a period of 50 years, should be considered for development and expansion of the port.
- Highway, railway and airway connections should be considered.
- Shallow seas and mountainous regions are the most important factors for port site selection.

Table 1. Iskenderun Gulf, Holistic Coastal Planning General Principles (DAMPO 2009).

GENERAL PRINCIPLES	
Sustainable Development Principle	Comprehensive, integrated and rational planning approach should be adopted.
Preventiveness Principle	Environmental Impact Assessment activities that should be carried out before investment, should be given great importance.
Prudence Principle	The competent authorities should use its authority on prohibition of the activities that might cause irreversible damage on the coastal regions or making regulations about these situations.
Estimation Principle	Risk analysis should be performed and necessary measures should be taken according to natural and man-made disaster scenario.
Rehabilitation Principle	Deformed textures should be get back to the old formation by rehabilitation.
Polluter/User Pays Principle	Deformed textures should be get back to the old formation by rehabilitation.
Appropriate use of Technology and Good Environmental Practices Principle	The extent of available sources, the high-tech should be used.
Informing the public and Public Participation Principle	The accession process to management focused decisions should be provided at the local level
International Cooperation Principle	In the fields of planning and management model development and application, international cooperation opportunities should be developed to develop a policy or produce a project.

## **5 REGULATIONS**

### **5.1 International**

European Union (EU) conducted some works in this context, Thus, Conference of the Peripheral Maritime Regions (CPMR) was established in 1973. It is working to promote a more balanced development of all Europe's regions and to increase regional competitiveness for the CPMR, sustainable development and the conservation of the environment and biodiversity are also priority issues. Its focuses in particular on energy policies and climate change mitigation and adaptation measures.

### **5.2 National (for Turkey)**

The first regulations on the coasts in Turkey were made with the amending Law No. 1605 at No. 6785 Construction Zoning Law in 1956. At which there has been 10 m of a zone from the coast where buildings cannot be built for the individual purposes. According to the regulations in Article 43 of the 1982 Constitution; "The coasts are under the sovereignty and disposal of the State. Public interest is considered first to benefit from the shores of the surrounding coastline of sea, lake and river. Thus, coasts, with the effect of the 1982 Constitution, Law No. 3086 issued in 1984 for the first time. However, the Law No. of 3086 with the entry into force, existing problems could not be solved and they remain. In subsequent years, with the legal arrangements made the width of coast lane, was first 30 m, and then it was 100 m. However, all these arrangement are not enough for the solution of the problems.

## **6 RESULTS AND CONCLUSION**

Since the 1970's, in order to encourage tourism, especially forests and fertile agricultural areas of Marmara, Aegean and Mediterranean coasts of Turkey have been polluted and destroyed. This was due to take benefit from the legal loopholes. Unfortunately, this period is currently in process. Some proposal for the solutions can be given such as; first, integrated coastal management policy should be established in the development plans. Goals and objectives should be clearly defined in plans. Geomorphological structure of the coast and bathymetry should be examined in detail, Shorelines must be determined in accordance with the scientific principles and coast should be considered as a whole with the impact of behind coast and related areas. Coordination between institutions and data sharing should be provided. Coastal structures must be compatible with the coastal geomorphology. People's demand should also be considered. Finally, while designing of the coastal structures should be taken into account the earthquake effects.

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